Lecture questions

In this exercise you will answer questions related to this week's lecture.

Note that you can submit the answer to each question only once. The questions are designed to be easy if you have followed the lecture. Note that the questions can vary slightly between students.

Points 10 / 10 My submissions 1 / 1 Deadline Friday, 19 May 2023, 19:00 To be submitted alone

You have used the allowed amount of submissions for this assignment.

Triadic closure

Question 1 10 / 10

Which of the following statements is *not* accurate regarding triadic closure:

- Triadic closure is a mechanism in network evolution where a network structure initially consisting of three nodes and two links forms a triangle. In social networks, this can be thought of as a node introducing two of its connections to each other.
- Triadic closure acts as an implicit preferential attachment mechanism. For example, if you introduce a friend to another person you know, you follow a link to the person and are more likely to introduce the friend to a person that has more connections.
- **Contrary to what one might expect, triadic closure often leads to networks with fewer triangles.**

✔ Correct!

Submit

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Preferential attachment

Question 1 10 / 10

Which of the following statements is *not* accurate in regard to preferential attachment:

- **Preferential attachment discourages the formation of hubs in the network, leading to an even degree distribution where most nodes have the same degree.**
- Preferential attachment implies that new links are more likely to connect to nodes that already have more connections, or a higher degree. In the case of linear preferential attachment, the probability of a new connection is directly proportional to the degree of the node.
- Preferential attachment is implicitly present in many network evolution mechanisms that use the network itself to create new connections. This can be seen in processes such as triadic closure, node copying, and finding new connections via random walks in the network.

✔ Correct!

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BA model

Question 1 10 / 10

Which of the following is *not* true for the Barabasi-Albert (BA) model:

- The BA model uses a preferential attachment mechanism, in which a new node added to the network at each time step connects to m existing nodes. The probabilities of these connections are proportional to the degrees of the existing nodes.
- **The BA model relies entirely on a random attachment mechanism, where new nodes connect to existing nodes in the network entirely by chance, irrespective of their degree.**
- The outcome of the BA model is a network with a high degree of heterogeneity. The degree distribution of the resulting network is approximately a power-law.

✔ Correct!

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Compartmental epidemic models

Question 1 10 / 10

Which of the following statements is *not* accurate regarding the compartmental epidemic models discussed in the lectures:

- **In compartmental models, nodes are allocated to compartments in such a way that interactions can occur between nodes of the same compartment, but not between nodes in different compartments.**
- In compartmental models, each node is in exactly one compartment at a time. These compartments can include categories like *susceptible* and *infected*, with nodes transitioning between compartments according to predefined rules. These rules can take into account the compartments of neighboring nodes. For instance, susceptible nodes might become infected at rates dependent on the number of infected nodes in their network neighborhood.
- The SIR model exhibits a phase transition: when the infection rate is low, almost no nodes become infected. However, when the infection rate increases and surpasses the epidemic threshold, a large proportion of the nodes in the network can become infected.

✔ Correct!

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Connnection between network structure and epidemic models

Question 1 10 / 10

Which of the following is *not* true for connection between network models and simple spreading models like the compartmental models:

- Infection spreading (or analogously, information spreading) is a process where the infection or information spreads across links in the network. This implies that nodes with a high degree are more likely to be infected. High-degree nodes are also better positioned to infect others as they have more connections and therefore more opportunities for spreading the infection. Consequently, the presence of high-degree nodes makes the spread of infection much more efficient.
- Degree heterogeneity lowers the epidemic threshold, that is, the infectivity required for the epidemic to reach a non-zero fraction of the nodes in a large network.
- **The universality principle states that network structure can have no impact on any spreading phenomena on networks.**

✔ Correct!

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Complex contagion

Question 1 10 / 10

Which of the following is *not* true for complex contagions:

- A social process in which a node adopts a behavior only when exactly k neighbors have adopted it is an example of complex contagion process.
- Group structures can play a significant role in complex contagion processes where social reinforcement is present. The spread of behavior adoption can be more efficient in networks with a well-defined group structure.
- **Complex contagion refers to any spreading process that occurs on simplicial complexes, which are types of hypergraphs that can be used to represent social networks with groups.**

✔ Correct!

Submit